

Article

Consumer Perception on Purchase Decision Factors and Health Indicators Related to the Quality and Safety of Meat Sold in Dibiteries in Dakar, Senegal

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Abstract: Accelerated socio-economic and demographic changes have led to the transformation of eating habits in sub-Saharan African cities including Dakar, Senegal. The result is the proliferation of informal fast-food establishments, such as the ‘dibiteries’ serving braised sheep meat. However, owing to poor hygiene practices, consumption of dibiterie meat poses a public health concern. It was unclear how the dibiterie meat quality and safety were perceived among customers who define their own purchasing social norms. A total of 165 meat consumers were randomly selected and interviewed, from 165 dibiteries sampled by convenience in the Dakar region using a structured questionnaire. Results showed that purchase decisions were guided by trust in the salesperson’s expertise, the taste of the product, perceived risk of meat contamination, tenderness, price, the nutritional value, the smell and the colour and freshness of the meat. The perceived quality and safety of dibiterie meat was expressed by the ‘organoleptic quality’, ‘environment and service’ and ‘price and trust of the product’s safety’ factors. The majority of consumers (61%) were ‘less concerned’ about the safety of dibiterie meat, and the acceptable price range of the product was between \$5.08 and \$7.62. As this food product is gaining popularity in Dakar and the majority of our participating consumers do not show high levels of concern, we suggest stricter standards.

Keywords: dibiterie; consumers; meat quality and safety; perception; dimension; purchase decision; principal component analysis; Senegal

1. Introduction

In sub-Saharan Africa, people are strongly attached to food traditions. Although consumers do choose their food based on the content of its calorific value and price, qualitative characteristics in relation to the preparation and socio-cultural references are equally crucial determinants [1]. In Senegal, the 1990s were marked by major socio-economic changes such as the introduction of the continuous workday by the state and the devaluation of the West African CFA Franc (CFA).

These changes, combined with increasing urbanisation, have strongly contributed to a widespread trend in out-of-home food consumption, especially in popular neighbourhoods, and to a significant change in Senegalese eating habits [2]. Indeed, for households living in difficult and precarious economic conditions, it is cheaper to buy a ready-made family meal than to prepare it at home [3]. Among the food services that cater for out-of-home food consumption, the development of dairy bars, canteens, fast food and the so-called ‘dibiteries’ perfectly illustrate the changes in the Senegalese food consumption patterns [4].

On a socio-cultural level, out-of-home food consumption is an act frowned upon by the Senegalese Muslim society. Indeed, in the Senegalese tradition, the act of eating is always synonymous with sharing [2]. According to Bonne et al. [5], in collectivist cultures such as the Muslim culture, people tend to see themselves as interdependent on their group. The individual who eats in isolation is therefore considered an unsocial being. Nevertheless, while women often have a more home-based role in these cultures, men are more prone to buy and consume food outside the home, such as in dibiterie establishments.

Dibiteries are a popular type of restaurant/food-bar that specialise in preparing and selling braised or roasted meat of small ruminants—mainly sheep and chicken [6,7]. They are predominantly managed by men of Senegalese, Mauritanian or Nigerian nationality, and they generally operate within the informal, unregulated trading system. Dibiteries are usually located in buildings that feature a chimney and are split into a work space for the meat preparation and a segregated eating space [6]. However, owing to their informal modus operandi, dibiteries often do not comply even with minimal quality and hygiene standards. High-risk practices are being regularly observed in these establishments, including the use of ice from water sources with potentially dubious quality to preserve the meat, exhibiting meat pieces in the open air, using recycled cement bags for the packaging of meat and/or the handling of money and meat products by the vendor without gloves or handwashing between working tasks. A qualitative risk assessment had previously indicated that these risky practices result in a 51% probability of microorganism contamination of the meat produced and sold in dibiteries in Dakar [8].

Foodborne diseases are recurrent in Senegal due to the proliferation of street food, changes in the methods of food preparation and processing and globalisation of trade, among other reasons. Indeed, 1 in 10 people gets sick every year from foodborne diseases. Yet, the country does not have a national food monitoring programme [9]. Nonetheless, the control of food safety is governed by a basic law (i.e., Law 66-48 of 27 May 1966). Technical quality control, the process of qualitative promotion and the promotion of animal source foodstuff are ensured by public control structures, including the Livestock Directorate, the Fisheries Directorate and the National Hygiene Service. Unlike in other countries, there is no single structure bringing together the management of the quality and food safety control [10]. Therefore, this system relies on individual responsibility-taking.

The decision to buy and eat meat is a direct outcome of how meat is perceived by the consumer [11]. Perception is defined by Grunert [12] as the process where consumers select, organise and interpret information for immediate decision-making. Therefore, the purchase decision is directly linked to stimuli accessible by the consumer prior to a purchase (i.e., quality cues) [13]. Thus, quality cues are prerequisite required for consumers to evaluate displayed products and to make a final decision at the point of purchase [14]. However, perceived cues are expected or experienced attributes of the product that consumers approach [15]. These perceived cues are related to the intrinsic (e.g., nutritional value) and extrinsic quality attributes of products (e.g., taste, colour, freshness, fat content and price) [16–18]. The visual appearance of meat related products is strongly based on the meat colour and therefore indicates a systemic relationship [19]. The freshness of meat is therefore linked to the bright colour of meat for predicting meat quality. Consumers normally believe that freshness of meat in a sanitised purchase outlet provides assurance for safer meat [20]. According to Font-i-Furnols and Guerrero [21], beliefs play a key role in the acceptance or rejection of a product because it could change the perception and image of that product.

Food safety is also a key attribute that influences consumers' acceptance and food choices [22,23]. If consumers have a negative perception of a meat product, for instance, by the previous occurrence of disease (i.e., foodborne infections) then their purchase behaviour will be adversely affected [24]. Indeed, poor hygienic conditions during preparation and distribution, combined with the popularity of the meat products sold, renders meat consumption in dibiteries a significant public health concern [8]. However, the reporting of isolated cases of foodborne diseases in Senegal is very rare. Moreover, according to the Veterinary Services Directorate, the number of declared outbreaks of foodborne diseases in 1991 amounted to 10,097 patients, including 670 hospitalised. The majority of cases were due to *Salmonella* with 4661 cases, including 23 deaths, and *Clostridium perfringens* with 2042 patients and 3 hospitalisations [25]. In addition, in 2001 the burden of foodborne diseases was estimated at 357,296 individual cases, 668,792 life days lost and a total cost of about \$7,183,239 per year [26]. Thus, with the recent increase in the awareness of the health problems that may result from unhygienic handling of meat, consumers have become more demanding and more concerned about the products sold at the dibiteries.

However, the assessment of the intrinsic and extrinsic quality of a product differs between individuals according to the attributes or indicators perceived important [16,17,27]. Besides the price of the product, factors such as appearance, convenience, perceived quality, safety, as well as social, individual, economic, and cultural including age groups aspects influence decisions made in the market place [16,17,28]. For example, Kara et al. have examined the consumers' perceptions of and preferences for fast-food restaurants in the United States and Canada [29]. They found that consumers between the age of 12 to 24 years looked for variety, price, delivery service and location in United States and for price and novelties in Canada. On the other hand, consumers of 46 to 55 years and above 55 years preferred cleanliness, nutritional value, quality and taste in United States and nutritional value and seating capacity in Canada [29]. Therefore, consumers consider several characteristics in order to determine the acceptance of food products, including sensory characteristics, nutritional value and convenience. [30].

Several studies on consumers' perception of meat quality and preference about fast food have been published [31–35]. However, those studies are limited to identify the purchase decision factors associated with the preference for fast food or the perceived meat quality. They did not consider the health component related to these perceived factors by the consumers despite the importance of food safety.

In Senegal, to the best of our knowledge, no study has examined these issues in the catering sector, in particular among dibiteries. It is unclear how the quality and safety is perceived among dibiterie meat consumers who define their own purchasing social norms. Therefore, in the context of non-compliance with the rules of good hygienic practices in dibiteries, understanding the determinants of consumer purchasing decisions of dibiterie meat is vitally important to ensure that policy makers are provided with the necessary information to develop and implement policies that protect consumer health. It also provides valuable information for the meat value chain actors (e.g., butchers and supermarkets) and dibiterie owners to improve their hygiene practices and provide good quality and safe meat according to consumer's perception.

The objectives of this study were (i) to evaluate the consumer's perception of the quality and safety of dibiterie meat; (ii) to identify the dimensions of the dibiterie meat quality and safety, and typology of the consumers according to their level of concern on the dimension related to 'health'; (iii) to characterise the types of consumers according to their socio-economic and demographic profiles; and (iv) to determine consumers' sensitivity to the prices of dibiterie meat.

2. Materials and Methods

2.1. Study Area and Sampling

The study area consisted of the city of Dakar and its suburbs, namely, Guédiawaye, Pikine and Rufisque, with an estimated population of 3,137,000 inhabitants [36] and high purchasing power for animal products compared to other regions.

A convenience sampling approach was used for selecting the dibiteries (Figure 1). This was a non-probabilistic method in which dibiteries were retained when encountered until the desired number of dibiteries was obtained. This approach was based on the continuous survey of dibiteries with the support of the veterinary and hygiene services, which sporadically check on their hygiene standards. This method was chosen due to the poorly defined areas where dibiterie establishments were located and the lack of a list of dibiteries at the technical service level.

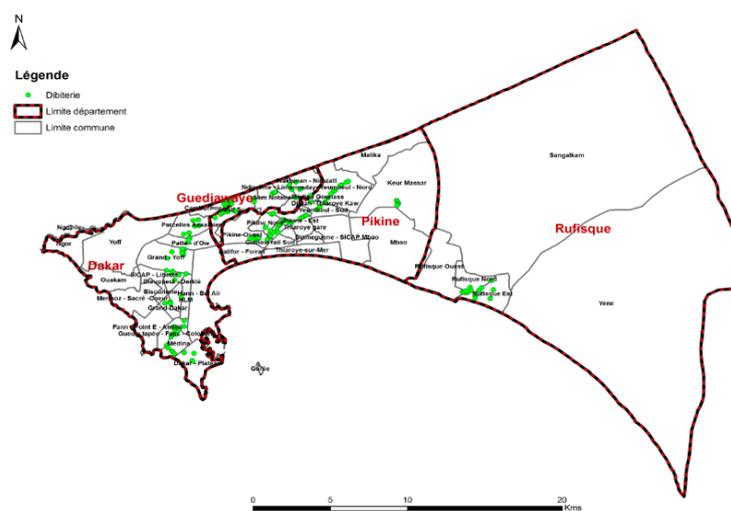


Figure 1. Distribution and suburbs of targeted dibiteries in the Dakar region.

The sample size of dibiteries to be targeted was determined using the Thrusfield [37] formula:

$$n = \frac{Z^2 * P (1 - P)}{d^2} \quad (1)$$

In this formula, n is the minimum sample size required; Z is the value of the normal law related to the probability value $1-\alpha/2$ with $\alpha = 5\%$, i.e., 1.96; P is the expected prevalence of dibiteries in Dakar. However, due to a lack of data on the prevalence of dibiteries in Dakar, this value was set at 10% consistent with the study conducted by Dione [38] on the search of pathogens in animal source foodstuffs sold on the Dakar market; d is the absolute desired precision (5%). The calculation showed that 138 dibiteries were required. According to Goyal and Singh [34], it was decided to investigate 200 dibiteries in total to constitute an adequate sample, equivalent to 200 consumers divided into 50 consumers in each of the four chosen study areas. Dibiteries were chosen by convenience upon arrival at a subset of businesses most likely to agree to the study, where the veterinary and hygiene services sporadically check on their hygiene standards. Oral informed consent was obtained from the owners and managers of the dibiteries the day before the administration of the questionnaire to consumers. One adult consumer (>18 years old) was randomly selected from people purchasing and eating meat in each of the study dibiteries, and oral informed consent was obtained prior to taking part in the survey. Consumers linked in any way to the production or selling of the products in the dibiterie were not included in the study. At the end of the survey, 165 consumers of dibiterie meat were investigated, i.e., 50 consumers in each of Dakar, Pikine and Guédiawaye, and 15 in Rufisque. While our sample of consumers is not representative of the whole of Senegal, our study it is the first

of its kind and does provide detailed information on a number of dibiteries and their customers in a Senegal urban setting.

2.2. Questionnaire and Data Collection

The survey was conducted using a structured questionnaire collecting information on (i) the socio-demographic characteristics of consumers; (ii) consumption patterns of dibiterie meat; (iii) types of dibiterie meat, the preferred parts and the purchase price; (iv) meat quality; (v) price sensitivity; (vi) consumption preferences; and (vii) the environment and quality of the service (the questionnaire is presented in the Supplementary Materials).

The data collection was carried out by face to face interviews with consumers of braised meat at dibiteries. The survey took place in the evenings from January to April 2015, at a rate of five consumers per day.

2.3. Theoretical Framework and Design of the Study

The quality theory based on the economics of information approach to user-oriented quality was used for the design of this study [39]. This approach, made up by three types of attributes, has been applied to meat by many authors [40,41]. Firstly, there are the indicators of expected quality or search attributes and often referred to as 'quality cues'—the evaluation of indicators of the nature of the products to be purchased. These quality cues can be categorised in two types, intrinsic and extrinsic cues. Intrinsic cues, described as inherent visible characteristics of the product, are significant in determining quality expectation in many fresh food categories. Extrinsic cues represent information related to the product but that is not physically part of the product, that can be modified externally [40]. Secondly, there are indicators of experienced quality that can only be revealed after the purchase and consumption of the product. However, according to Verbeke et al. [42], consumers expect experience quality to match their expectation and as a result are becoming more open to the use of extrinsic cues to support such evaluations. Thirdly, there are indicators of belief quality or credence quality—characteristics that persist even after the purchase and consumption of the product. According to Henschion et al. [40], credence quality refers to those product dimensions that cannot be assessed even on consumption. This involves health and process benefits (that may satisfy moral and ethical needs) and a consumer cannot with any degree of certainty assess or confirm their existence.

Moreover, research evidence indicates that the use of some intrinsic cues to infer quality may be dysfunctional [43,44]. According to Henschion et al. [40], this suggests a discord between expected and experienced quality due to misconception of certain intrinsic cues. Grunert [45] argues that is due to the misplaced reliance on intrinsic quality cues, which could be as a result of relatively few extrinsic cues available to support consumer evaluations. Therefore, this undermines consumer's confidence in the sector, increases their uncertainty regarding quality expectations and can result in dissatisfaction [40]. In addition, extrinsic cues offer considerable potential in supporting consumer quality evaluations in light of evolving purchasing motives linked to changing demographics, lifestyles and knowledge, and rising concerns on safety, health and ethical factors [13,45].

In the present study, the three types of attribute of the quality theory previously described were used. However, the attributes of the experience and belief quality were analysed together, because healthiness quality evaluations involved an amalgam of intrinsic and extrinsic uses [42]. Finally, the socio-demographic and economic characteristics of consumers were integrated into the analyses in order to identify their effect on the components of the quality perception of the dibiterie meat. Indeed, historical, social and cultural factors need to be taken into account when considering how quality attributes, as delivered by supplier, are translated into a bundle of need satisfying benefits by consumer [40].

Based on earlier studies conducted on the perception of the meat quality in Morocco and Tunisia [46–48], the present study evaluated 17 variables that may influence consumers' purchase

decisions and measure their perceptions on the dibiterie meat quality. For each of these attributes of quality, the consumer had to report their attitude by indicating their degree of attachment to each of the variables on a five-point Likert scale ranging from (1) 'strongly disagree' to (5) 'strongly agree' based on the answers to the question linked to the elements that encourage purchase.

2.4. Data Management and Statistical Analysis

This study was designed based on a double variance, i.e., variance between dibiteries and variance between consumers. However, although the surveys involved the context of the dibiteries, the analyses aggregated all participants and did not differentiate between dibiteries. This may limit the validity of the result interpretations, as the evaluation of product quality is not consistent.

The consumer's perception of quality was measured by using the scoring method. The average of the criteria scores (ACS) followed by the standard deviation (SD) were calculated by cumulating the scores of all the interviewees for each criterion and dividing them by the total number of interviewees. Thus, the higher the average score of the attribute of the quality, the more the consumer accords importance to this quality indicator in the process of the purchase decision-making. In this case, the consumer consents more often to buy the product. However, a reliability analysis of the internal consistency was done using the α coefficient of the Cronbach test. The threshold α of acceptable reliability has been set at 0.6 [49].

The components or dimensions of the quality were identified with principal component analysis (PCA) with orthogonal rotation (Varimax) using SPSS Statistics software version 24.0. A dimension was selected and identified if its initial eigenvalue was greater than or equal to 1. A variable (item) was retained in a component if its absolute initial eigenvalue was greater than 0.3. Discriminant analysis was carried out on the different dimensions identified and a dimension was declared as discriminating at the significance level of 1%. A dynamic cluster analysis using the discriminant components of dibiterie meat quality as dependent variables was performed. Analysis of variance (ANOVA) was used to discriminate between consumer groups. However, the choice of the consumer groups was based on the significant link between the dependent variables (discriminant dimensions) and the type of groups identified at the 1% threshold. In addition, the identification of the different groups was carried out according to their degree of importance for the 'health' component. Moreover, ANOVA and cross-tabulation procedure were used at the significance level of 1%, 5% and 10% to characterise consumer groups according to their socio-economic and demographic profiles.

The price sensitivity of dibiterie meat consumers was examined by determining the 'acceptable' price zone [50]. This zone is defined by the intersections between, on one hand, the price curves declared as 'too expensive' and 'cheap' and, on the other hand, the price curves declared as 'too cheap' and 'expensive'. These different curves are obtained by combining the answers to the following four questions: (i) 'at what price do you think this product is too cheap, you don't buy it because you doubt its quality?'; (ii) 'at what price do you think this product is cheap, in which case you buy it without doubting its quality?'; (iii) 'at what price do you think this product is expensive, but you buy it anyway?'; and (iv) 'at what price do you think this product is too expensive, in which case you will never consider buying it?' The answers to these questions were expressed as cumulative frequencies in a graph showing four curves defining a zone of acceptable prices.

3. Results

3.1. Characteristics of Dibiterie Meat Consumers

The majority of *dibiterie* meat consumers were male (79%), married (56%) and Muslim (92%) (Table 1). They were on average 35 ± 11 years old with 39% between 30 and 40 years of age. The *dibiterie* meat consumers were renting (84%) and the majority was found to belong to the Wolof ethnic group (44%). The same proportion of consumers had no formal education (30%) or secondary school education

(30%). Manual labourers and the unemployed (69%) were the socio-professional categories most encountered in dibiteries.

Table 1. Socio-demographic profile of dibiterie meat consumers in the Dakar region (n = 165).

| Variable | Category | Frequency | Percentage (%) |
|-----------------------------|---|-----------|----------------|
| Gender | Male | 130 | 79 |
| | Female | 35 | 21 |
| Age (year) | 18–20 | 8 | 5 |
| | 20–30 | 44 | 27 |
| | 30–40 | 65 | 39 |
| | >40 | 48 | 29 |
| Marital status | Single | 71 | 43 |
| | Married | 93 | 56 |
| | Widowed | 1 | 1 |
| Level of formal education | Without formal education | 50 | 30 |
| | Primary | 36 | 22 |
| | Secondary | 50 | 30 |
| | University | 29 | 18 |
| Religion | Muslim | 152 | 92 |
| | Christian | 13 | 8 |
| Ethnic group | Wolof | 73 | 44 |
| | Sérère | 18 | 11 |
| | Peulh/Toucouleur | 27 | 16 |
| | Lébou | 16 | 10 |
| | Other Senegalese ethnicities | 20 | 12 |
| | Non-Senegalese ethnicities ^a | 11 | 7 |
| Socio-professional category | Public servant | 11 | 7 |
| | Employee | 14 | 8 |
| | Manual-workers and unemployed | 113 | 69 |
| | Others ^b | 27 | 16 |
| Housing status | Owner | 27 | 16 |
| | Tenant | 138 | 84 |
| Type of dwelling | Hut/shanty | 2 | 1 |
| | Simple building | 78 | 47 |
| | Storey building | 82 | 50 |
| | Villa | 3 | 2 |

^a Bété, Bissa, Kanouri, Krobou, Maures, Mossi, Yorouba; ^b student, schoolboy, retired official.

3.2. Consumer's Perception of the Quality and Safety of Dibiterie Meat

The purchase decision of dibiterie meat was guided by the consumers' perception of the quality of the product. This perception was measured through two types of indicators or attributes of the quality of food products. The results suggest that consumers rely on attributes of expected quality and the experience and belief quality indicators (consumers own belief in the quality of the product) when purchasing dibiterie meat, with Cronbach's α equal to 0.61 and 0.70, respectively (Tables 2 and 3).

With regard to the attributes of the expected quality, it appeared that the best guides on which the consumers rely on before purchasing dibiterie meat are the extrinsic indicators. These are in descending order of importance: the salesperson's expertise, price and quality of the service. The criteria of intrinsic quality, namely, the colour and smell of fresh meat had lower priority.

Table 2. Average importance of attributes of expected quality of dibiterie meat.

| Items | Mean \pm SD | α Cronbach |
|--|-----------------|-------------------|
| Salesperson's expertise | 4.96 \pm 0.23 | 0.61 |
| Price | 4.51 \pm 0.91 | |
| Quality of the service | 3.88 \pm 1.50 | |
| Nature of the premises | 3.78 \pm 1.44 | |
| Colour (fresh meat) | 3.61 \pm 1.46 | |
| Smell (fresh meat) | 3.48 \pm 1.51 | |
| Choice of meat pieces | 3.39 \pm 1.72 | |
| Proximity of the dibiterie pemise | 3.29 \pm 1.84 | |
| Scale statistics | | |
| Mean and SD = 30.90 \pm 5.82; Variance = 33.89; Number of items: 8 | | |

Consumers also perceive the dibiterie meat quality through the indicators of quality of experience and belief. Among these attributes, those of sensory quality and appearance were rated the most important, i.e., taste, tenderness, smell, colour and juiciness with an average score of 21.57.

Moreover, considering all the attributes of quality, the purchase decision of dibiterie meat was determined in the first place by the salesperson's expertise and the taste of the braised meat which are extrinsic and sensory quality indicators, respectively. Perceived risk of meat contamination, the tenderness of the braised meat, the price and the nutritional value of the meat were later used by the consumers during the purchase. Finally, the smell and colour of the braised meat and the meat freshness were rated less important.

Table 3. Average importance of attributes of experience and belief quality of the dibiterie meat.

| Items | Mean \pm SD | α Cronbach |
|--|-----------------|-------------------|
| Taste | 4.87 \pm 0.57 | 0.70 |
| Perceived risk of meat contamination | 4.76 \pm 0.68 | |
| Tenderness | 4.65 \pm 0.73 | |
| Nutritional value | 4.50 \pm 1.06 | |
| Smell (braised meat) | 4.33 \pm 1.15 | |
| Colour (braised meat) | 4.22 \pm 1.18 | |
| Meat freshness | 4.02 \pm 1.15 | |
| Presence of cholesterol (here, cholesterol is likened to fat) | 3.55 \pm 1.19 | |
| Juiciness | 3.50 \pm 1.22 | |
| Scale statistics | | |
| Mean and SD = 38.40 \pm 4.81; Variance = 23.13; Number of items: 9 | | |

3.3. Dimensions of the Dibiterie Meat Quality and Safety, and Typology of the Consumers According to Their Level of Concern on the Dimension Related to 'Health'

The PCA demonstrated an aggregation of the variables on consumers' attitudes towards the dibiterie meat quality along four dimensions (Table 4). The Kaiser-Meyer-Olkin (KMO) index (0.706) and the significant Bartlett sphericity test ($p < 0.01$) indicate a good quality of the sampling of the different attributes (variables). Among the four dimensions of the dibiterie meat quality, three were distinct ($p < 0.01$), namely, the 'organoleptic', 'environment and service' and 'price and trust of the product's safety' dimensions. The dimension 'belief and security of the product' was therefore removed from the rest of the cluster analysis. These dimensions explain the consumers' decisions to purchase braised meat with a cumulative variance of about 49%.

Table 4. Components of dibiterie meat quality perceived by the consumers in the Dakar region (***) significant at $p < 0.01$.

| Items | Organoleptic | Environment and Service | Price and Trust of the Product's Safety | Belief and Security of the Product |
|--|--------------|-------------------------|---|------------------------------------|
| Colour (fresh meat) | 0.814 | 0.201 | −0.003 | −0.130 |
| Colour (braised meat) | 0.781 | 0.073 | 0.154 | 0.148 |
| Smell (fresh meat) | 0.718 | 0.200 | 0.167 | 0.195 |
| Smell (braised meat) | 0.693 | 0.264 | 0.006 | −0.121 |
| Juiciness | 0.494 | −0.106 | 0.060 | 0.380 |
| Nature of the premises | 0.220 | 0.737 | −0.137 | 0.092 |
| Quality of the service | 0.082 | 0.712 | −0.147 | 0.153 |
| Proximity of the dibiterie premise | 0.071 | 0.551 | 0.164 | −0.261 |
| Choice of meat pieces | 0.179 | 0.412 | 0.194 | −0.021 |
| Taste | 0.234 | −0.203 | 0.695 | −0.054 |
| Perceived risk of meat contamination | 0.209 | 0.216 | 0.624 | −0.103 |
| Salesman's expertise | 0.025 | 0.131 | 0.525 | 0.360 |
| Tenderness | 0.093 | −0.153 | 0.522 | 0.249 |
| Price | −0.144 | 0.064 | 0.451 | 0.168 |
| Presence of cholesterol | 0.003 | 0.126 | 0.096 | 0.646 |
| Nutritional value | −0.033 | 0.028 | 0.291 | 0.620 |
| Meat freshness | 0.281 | −0.292 | −0.041 | 0.557 |
| <i>p</i> -value | 0.000 *** | 0.000 *** | 0.000 *** | 0.194 |
| Factor statistics | | | | |
| Initial eigenvalues | 3.503 | 2.168 | 1.382 | 1.245 |
| Cumulative variance (%) | 20.608 | 33.363 | 41.490 | 48.811 |
| Kaiser-Meyer-Olkin index and Bartlett test | | | | |
| Kaiser-Meyer-Olkin index for the measurement of the sampling quality | | | | 0.706 |
| Bartlett sphericity test | | Approximate chi-square | | 624.247 *** |
| | | Degrees of freedom | | 136 |

The first dimension—‘organoleptic’—was characterised by the attributes of visual quality such as the colour of the meat (fresh and braised) and sensory quality indicators including the smell of the meat (fresh and braised) and the juiciness of the braised meat. The second dimension—‘environment and service’—was essentially determined by the extrinsic quality indicators such as the nature of the premises, the quality of service, the proximity of the dibiterie premise to the consumer and the choice of the piece of meat. The third dimension—‘price and trust of the product's safety’—combined all other indicators of sensory or experience quality (taste, tenderness), extrinsic quality indicator (price) and belief quality indicator related to health (perceived risk related to the meat contamination).

The dynamic cluster analysis of the three discerning dimensions allowed to identify three groups of consumers selected on the basis of their significance ($p < 0.05$) with the dimensions. The classification of these groups was also made according to the importance that each of them had with the dimension related to ‘health’, in particular the ‘price and trust of the product's safety dimension (Table 5). The average scores of the different groups of consumers identified ranged from −2.7 to 1.1.

The first group represented 11% of the sample and were categorised as ‘indifferent’. This group was indifferent to any of the three components of the dibiterie meat quality. Its average attachment scores were negative regardless of the type of dimension. Moreover, the group was more indifferent to the ‘health’ dimension with a score of −2.2 compared with the other two dimensions. The second group consisted of 61% of the consumers of the sample. Its low degree of attachment (score of 0.2) to the ‘health’ dimension resulted in a ‘less concerned’ category. However, the decision of the consumers of this group to buy the dibiterie meat was strongly guided by the ‘environment and service’ and ‘organoleptic’ dimensions with the mean attachment scores of 0.5 and 0.4, respectively. The third group, representing 28% of the sample, were the one who were ‘most concerned’ about the ‘health’ dimension with a very high attachment mean score (0.5). A difference between the three groups of consumers was observed according to their socio-demographic profile.

Table 5. Typologies and characterisation of the groups of dibiterie meat consumers in the Dakar region.

| Dimension of the quality | F | Significance | Groups of Consumers | | |
|---|---------|--------------|---------------------|-------------------|------------------|
| | | | Group 1 (n = 18) | Group 2 (n = 101) | Group 3 (n = 46) |
| | | | 11% | 61% | 28% |
| Typology According to the 'Health' Dimension (in Score) | | | | | |
| | | | «Indifferent» | «Less concerned» | «Most concerned» |
| Organoleptic | 26.002 | *** | −0.568 | 0.391 | −0.636 |
| Environment and service | 70.151 | *** | −0.005 | 0.486 | −1.066 |
| Price and trust of the product's safety | 118.644 | *** | −2.164 | 0.170 | 0.473 |
| Mean | 71.599 | *** | −2.737 | 1.047 | −1.229 |
| Sociodemographic status | | | | | |
| Age | | | | | |
| 18–20 | 0.981 | | 0% | 5% | 6% |
| 20–30 | 2.588 | | 45% | 26% | 22% |
| 30–40 | 3.465 | * | 33% | 35% | 52% |
| >40 | 0.804 | | 22% | 34% | 20% |
| Ethnicity | | | | | |
| Wolof | 3.775 | ** | 44% | 52% | 28% |
| Sérère | 2.715 | | 5% | 9% | 17% |
| Peulh/Toucouleur | 1.578 | | 28% | 15% | 13% |
| Lébou | 5.497 | ** | 6% | 6% | 20% |
| Other Senegalese ethnics | 0.514 | | 0% | 14% | 13% |
| Not Senegalese ^a | 0.202 | | 17% | 4% | 9% |
| Geographical location | | | | | |
| Dakar | 0.489 | | 72% | 18% | 41% |
| Pikine | 0.981 | | 6% | 35% | 28% |
| Guédiawaye | 7.426 | *** | 22% | 43% | 7% |
| Rufisque | 15.821 | *** | 0% | 4% | 24% |

^a Bété, Bissa, Kanouri, Krobou, Maures, Mossi, Yorouba. *** significant at $p < 0.01$, ** significant at $p < 0.05$, * significant at $p < 0.1$.

3.4. Characterisation of the Types of Consumers According to Their Socio-Demographic Profile

A difference between the three groups of consumers was noted according to their socio-demographic profile. Among the socio-demographic variables introduced, three were discriminate, namely, age, ethnic group and geographic location (Table 5). The other socio-demographic variables were not significantly different between the consumer groups identified.

Group 1, 'indifferent' to the 'health' dimension, was represented by 33% of consumers aged between 30 and 40 most of them being from the Wolof ethnic group (44%). Geographically, in this group, 22% of consumers lived in the Guédiawaye district. Group 2, 'less concerned' by the 'health' dimension, consisted mainly of consumers aged between 30 and 40 years (35%) and 52% were Wolofs. They were mostly located in the district of Guédiawaye (43%) and some in Rufisque (4%). As for group 3, 'most concerned' by the 'health' dimension, 52% of consumers were in the age range of 30–40 years old. This group was characterised by 28% of Wolofs and 20% of Lébou ethnic groups. Consumers in this group were more prevalent in Rufisque (24%) and some in Guédiawaye (7%).

3.5. Sensitivity of Consumers to the Prices of the Dibiterie Meat

The sensitivity to the selling price per kilogram of dibiterie meat presented shows that the acceptable price range of this product was between \$5.08 and \$7.62 (Figure 2). The purchase prices within the dibiteries were on average from \$8.01 to \$8.16 per kg. These market prices were considered acceptable by the majority of consumers (58%), but too expensive for 41% of respondents. The majority of respondents (84%) were willing to pay an extra of \$0.5 to \$0.84 on the purchase prices to improve the defects of the dibiterie meat quality.

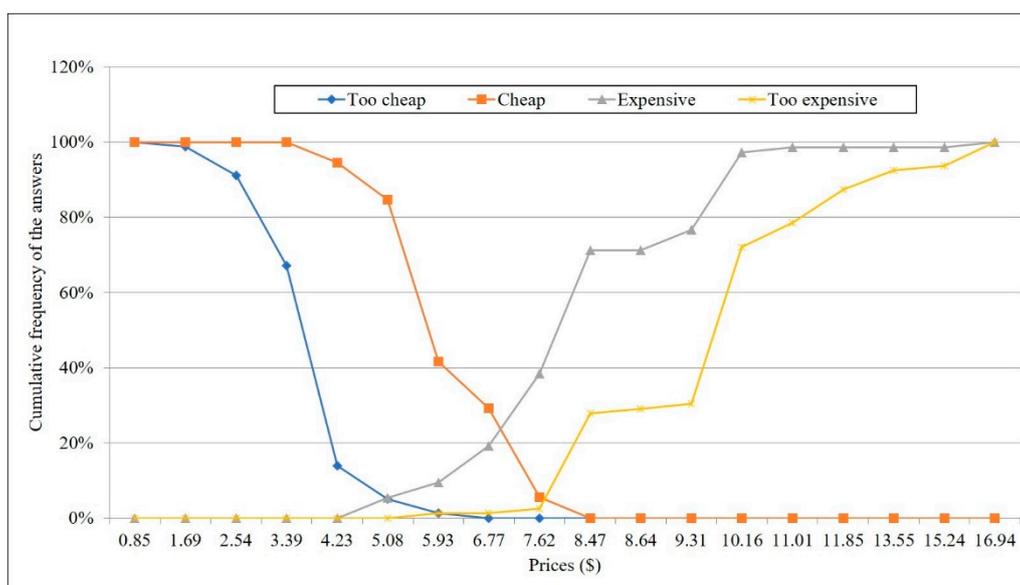


Figure 2. Sensitivity of consumers to the prices per kilogram of dibiterie meat.

4. Discussion

The results of the present study showed that purchase decisions of dibiterie meat by consumers were guided by the salesperson's expertise, the taste of the product, the perceived risk of meat contamination, tenderness, price, the nutritional value, the smell and braised meat colour and freshness. The perceived quality of dibiterie meat was expressed by three discriminating dimensions: 'organoleptic', 'environment and service' and 'price and trust of the product's safety. Moreover, the majority of consumers were 'less concerned' about the safety of dibiterie meat. However, the characterisation of this consumer group shows that their ethnic origin and geographical location were the most distinguishing factors explaining this situation.

The present study has some limitations. The design of this study was based on a double variance, namely, the variance between dibiteries and variance between consumers. Firstly, the dibiterie establishments as a sampling unit could lead to underestimating the sample size of the consumers which represent the unit of analysis of the study. Furthermore, the sampling of consumers was conducted in a way to render the sample more representative of the Senegalese population according to age, although a bias in gender was obtained given the lack of data on the social structure of the Senegalese population consuming dibiterie meat. Secondly, data analysis does not account for the variance between dibiteries, by aggregating all participants given the fact that the consumers represent the unit of analysis. Although the surveys also involved the context of the dibiteries, this limits the validity of the interpretation of the results and the conclusions cannot be extrapolated to the whole Senegalese population. Therefore, the analyses and conclusions of this study are on a more exploratory level. These different limitations should be taking into account in the design and data analysis to build future studies.

4.1. Consumers' Perception towards the Dibiterie Meat Quality

The results of the present study show that purchase decisions of dibiterie meat among consumers in Dakar were determined overall by the attributes of expected quality and the experience and belief quality indicators. The importance of these attributes may be explained by the consumers' perceived quality of the nature of the meat. Indeed, due to the lack of information given, it is quite difficult for the consumer to identify the intrinsic quality of the meat, which is an extremely perishable product and the quality is never constant [51]. It follows that meat is often sold without important identifying information, as is the case in dibiterie establishments. Thus, according to Zeithmal [52],

when it is difficult for the consumer to evaluate the quality of a product to be purchased or when the intrinsic parameters of the product are difficult to access, it is the extrinsic indicators that will define the choice of the buyer. For this purpose, extrinsic attributes offer considerable potential to support consumer-perceived quality assessments in light of changing purchasing motivations related to demographic growth, education and lifestyles and the growing concerns with security, health and ethical factors [13,45]. Ettabti [48], who conducted a study on the perception of the quality of fresh red meat by Moroccan housewives, also found that extrinsic criteria are more used by Moroccan housewives to measure the quality of red meat.

The high importance of the results awarded to the salesman's expertise criterion perfectly illustrates the role that the dibiterie meat vendor can play in the meat quality evaluation with the consumer. This 'consumer-vendor' relationship is built on trust. This aspect, which demonstrates the importance of the role of the seller in the evaluation of the quality of agri-food products, was also highlighted in the studies on fresh red meat [48], wine [53] and milk [54]. Consumers based their judgement, secondarily, on the taste of the braised meat. This indicates the use of sensory measures to evaluate the quality of the dibiterie meat. The present study also shows that the smell and braised meat colour and freshness are the least important indicators of the quality perception among consumers of dibiterie meat in Dakar. Unlike our results, Xazela et al. [31] in South Africa highlighted that the perception of meat quality by rural consumers was most associated with colour, tenderness, juiciness and thinness. On the other hand, Rani et al. [33] found that the consumers used freshness as the most important attribute when buying fresh meat in the butcher's place in South Africa. In contrast, Becker et al. [55] found that the country of origin and purchase place were the most important indicators for consumers when buying red meat in Germany. These differences show the complexity of consumer perspectives on meat quality raised by many authors in the scientific literature [42,45,56]. Indeed, judgments on meat quality vary from persons through societies and cultures, thus within the same region and outside different regions [40,57].

However, the attributes of sensory measures such as taste, tenderness, smell and colour are not only the intrinsic criteria to the product, but also typical experience attributes readily available to the buyer [58,59]. However, Grunert [60] raised the problem of uncertainty because the consumer cannot predict the taste or quality as the product is consumed after the purchase. This problem is confirmed by Juhl and Poulsen [61] especially for non-labelled and highly perishable products such as meat. These sensory criteria would be a priori related to the expertise that expresses the intrinsic experience of the vendor. The same trends are confirmed in the studies conducted by Mankor [62] and Ettabti [48] on meat consumption in Senegal and Morocco, respectively.

The high degree of attachment to the prices of dibiterie meat may be due to the fact that, in Senegal, sheep meat is a luxury. The consumption is, therefore, limited not only by its price but also the low income of the population of this study consisting mainly of day labourers and the unemployed. According to Bosona and Gebresenbet [63], consumers tend in general to buy food products with good taste and price, that are easily available and convenient to purchase as well as environmentally friendly. However, unlike us, they found the price to be a relatively less important parameter among Swedish consumers of organic food. Moreover, the importance of price in meat-buying decisions has been described in several studies and was considered the main factor influencing that decision. It follows that consumption of meat increases with household income [17,48,62].

Besides the price of dibiterie meat, the belief or credence quality cues such as the perceived risk of meat infection and the nutritional value are also important to the consumers in Dakar. Meaning that the dibiterie meat consumers pay attention to their well-being, including hygiene and sanitary issues, during the purchasing process. In line with our results, Alao et al. [15] found that consumers in South Africa have nutritional knowledge of the offal meat products before making their purchase. According to Liana et al. [28], consumers are now demanding food products that are safe and of good quality, that benefit their well-being at a reasonable price.

4.2. Consumers and Their Attitudes toward Dibiterie Meat Quality and Safety

The study allowed us to identify four dimensions or components called ‘organoleptic’, ‘environment and service’, ‘price and trust of the product’s safety’ and ‘belief and product safety’, explaining consumer attitudes towards *dibiterie* meat quality. This result is in part similar to that of Dhraief and Khaldi’s [46], who also identified in their study four dimensions of meat quality in Tunisia. However, differences were noted in the denominations of the different dimensions. This difference could result from the target population and the products that were investigated. Indeed, their study had evaluated several types of meat (i.e., beef, sheep and poultry) with their target population directed at households, while ours focused on braised sheep meat consumed in the dibiteries. Our results differ from those of the study of Dhraief et al. [64] conducted on the perception of the quality of fresh fish in Tunisia with three dimensions identified.

The three discriminating dimensions allowed us to classify the consumers of dibiterie meat into three groups and to create a typology according to their degree of attachment or concern vis-a-vis to the ‘health’ dimension. The average scores of the different groups of consumers identified vary from -2.7 to 1.1 . This result indicates the variability among the three groups in relation to their degree of attachment to the dimensions of dibiterie meat quality. The groups may look alike for a given quality dimension, but they show significant differences across all dimensions. The results show that the majority of consumers (61%) of the dibiterie meat are ‘less concerned’ about the ‘health’ dimension. Only 28% of consumers were ‘more concerned’ about the ‘health’ dimension of dibiterie meat. This difference is mainly due to the variable socio-demographic conditions of the sample population, which results in particular purchase and consumption patterns. Indeed, it is the variables related to age, ethnic group and geographical location (area of residence) that cause a significant difference between consumer groups. Indeed, the high proportion of people from the Guédiawaye district, an area considered as a suburb of the Dakar region, could be linked to the ‘least concern’ of consumers towards the ‘health’ dimension. Their attitudes towards the dibiterie meat quality were guided more by the dimensions ‘organoleptic’ and especially ‘environment and service’. The consumers in this context have a lack or insufficiency of information on the health implications associated with the meat consumption. This lower concern towards the ‘health’ dimension may also be linked to the consumption preferences of persons from Wolof ethnic group, who are mainly in group 2. Indeed, this ethnic group has a preference of consumption oriented towards beef, because of its low loss capacity of volume during cooking [62].

With regard to the group of consumers that are ‘most concerned’ towards the ‘health’ dimension, it consists of many people whose age is between 30 and 40 years and is comparable to the other two groups. The higher age of consumers in this group reflects the importance they give to their health. Indeed, as the age of people increases, the more they have to pay attention to their health by adopting healthier lifestyles or eating habits towards the risks of non-communicable diseases. According to Dhraief et al. [64], older people should pay attention to their health by reducing their consumption of animal fats and increasing their consumption of fish. In this group, we considered that consumers were therefore more inclined to favour food products beneficial to their well-being.

Overall, the results of this study show that a high proportion of dibiterie meat consumers are less concerned (61%) and indifferent (11%) to the health component associated to meat consumption. It therefore appears that, in general, the consumers’ purchasing decisions towards dibiterie meat are not guided by health concerns such as the risks of foodborne infections. This situation suggests that dibiterie meat consumers could be exposed to foodborne diseases. Indeed, a qualitative risk assessment had indicated that the meat produced and sold in dibiteries in Dakar has a 51% chance to have a ‘relatively high’ to ‘very high’ microbial contamination rate; this is due to the lack of good hygiene practice rules followed by staff [8]. Our observations are the same as those made by Alao et al. [15], showing that despite the nutritional knowledge of the consumers on offal meat products, health reasons emerged as a factor that the consumers considered the least at point of purchase. However, these purchasing decisions are oriented towards attributes of extrinsic and sensory

quality (criteria as to quality of the experience) expressed by the ‘organoleptic’ and ‘environment and service’ dimensions. These last dimensions, indeed, represent the variables of the guarantee of the dibiterie meat quality. This result may be linked to the fact that dibiterie meat consumers lack the information necessary to evaluate quality cues related to health. Thus, they are easily oriented towards indicators that are more perceptible and easier to verify, such as those related to the use of sensory organs.

Consumers’ purchase decision factors are far from safety or health indicators and may hardly protect them from the risk of disease. Therefore, introducing quality standards and a comprehensive policy will provide good reasons for improved dibiteries hygienic management practices.

5. Conclusions

Consumers do attempt to judge the dibiterie meat quality through extrinsic and sensory quality indicators. Several variables such as the trust in the salesperson’s expertise, the taste of the product, the perceived risk of meat contamination, tenderness, price and the nutritional value of the dibiterie meat were ranked as the most influential in making a positive purchase decision. The perceived quality and safety of dibiterie meat was expressed by ‘organoleptic quality’, ‘environment and service’ and ‘price and trust of the product’s safety’. Two thirds of consumers were ‘less concerned’ about the safety of dibiterie meat, and the acceptable price range of the product was between \$5.08 and \$7.62. However, factors such as price sensitivity, ethnicity, age and geographical location of the consumers in Dakar allow to differentiate them on their level of concern towards the dibiterie meat quality and safety. As dibiterie meat is gaining popularity, better hygiene rules and enforcement of strict quality standards designed are needed to protect the health and well-being of consumers.

Given current nutrition transitions and the high incidence of non-communicable diseases (NCDs) related to the diet changes observed in African cities, further research on the assessment of the determinants of consumers intention to eating dibiterie meat against the risks of NCDs will be needed to identify the intervening factors of food security, nutrition and health status of consumers.

Supplementary Materials: The following are available online at <http://www.mdpi.com/2071-1050/12/18/7428/s1>, Questionnaire: Structured questionnaire addressed to dibiterie meat consumers.

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